

EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS  
ON THE TOMBIGBEE RANGER DISTRICT OF THE TOMBIGBEE  
AND HOLLY SPRINGS NATIONAL FORESTS, MISSISSIPPI

By

Charles W. Dull, James D. Ward and Robert F. Bassett

INTRODUCTION

Aerial surveys for the detection of southern pine beetle, *Dendroctonus frontalis* Zimm., on the Tombigbee Ranger District (Ackerman, Yalobusha and Trace Units) were conducted by the Doraville Office of the Forest Insect and Disease Management Unit during January 17-18, 1977. Subsequent on-site examinations of selected infestations observed during the aerial phase were conducted in February, 1977.

The Tombigbee Ranger District has incurred relatively little damage due to southern pine beetle infestations over the past ten years. However, results of the current surveys have revealed increasing southern pine beetle populations within the past year. The purpose of these surveys was to evaluate the status of the southern pine beetle infestations on the Tombigbee Ranger District.

METHODS

Standard aerial sketchmap survey methods were used during this evaluation<sup>1/</sup>, <sup>2/</sup>. Aerial survey coverage was 50 percent. Spots of red and/or fading pine trees were

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<sup>1/</sup> Detection of Forest Pests in the Southeast. 1970. USDA, USFS, SA S&PF, Div. of FPM, Pub. S&PF-7, Atlanta, Ga. 51 pp.

<sup>2/</sup> Evaluating Southern Pine Beetle Infestations. 1970. USDA, USFS, SA, S&PF, Div. of FPM, Pub. FPM-3, Atlanta, Ga. 35 pp.

plotted with the estimated size of the infestations on Forest Service Class A maps. Aerial survey data were expanded to estimate damage for 100 percent coverage. Eleven infestations detected during the aerial phase of the evaluation were examined on the ground to confirm the cause of tree mortality, the percent of spots actively infested and condition of the brood.

## TECHNICAL INFORMATION

### Primary causal agents

- Southern pine beetle, *Dendroctonus frontalis* Zimm.
- *Ips* species - *avulsus* Eichh.,  
                  *grandicollis* (Eichh.),  
                  *calligraphus* (Germ.).

Host Trees Attacked - The southern pine beetle is a native forest pest that will attack all species of southern yellow pine. Susceptible southern yellow pines occurring on the Tombigbee Ranger District are loblolly, *Pinus taeda* L., and shortleaf, *P. echinata* Mill.

Type of Damage - Southern pine beetles cause tree mortality by mining in the cambium as they construct egg galleries. The attacking beetles also introduce blue stain fungi, *Ceratocystis* spp., which inhibit conduction of water in the stem.

*Ips* damage is similar to the southern pine beetle. *Ips* species attack may or may not accompany the attack of other bark beetles.

Life Cycle - Adult beetles attack green trees and construct winding galleries in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish larvae that further mine the cambium and then construct cells in the bark where they pupate and change to adults. The adults chew through the outer bark and emerge. The complete life cycle takes about a month during the summer, and as many as seven generations may be produced a year in Mississippi. The different stages in southern pine beetle development are illustrated in Figure 1. The life cycle and stages of *Ips* spp. are illustrated in Figure 2.

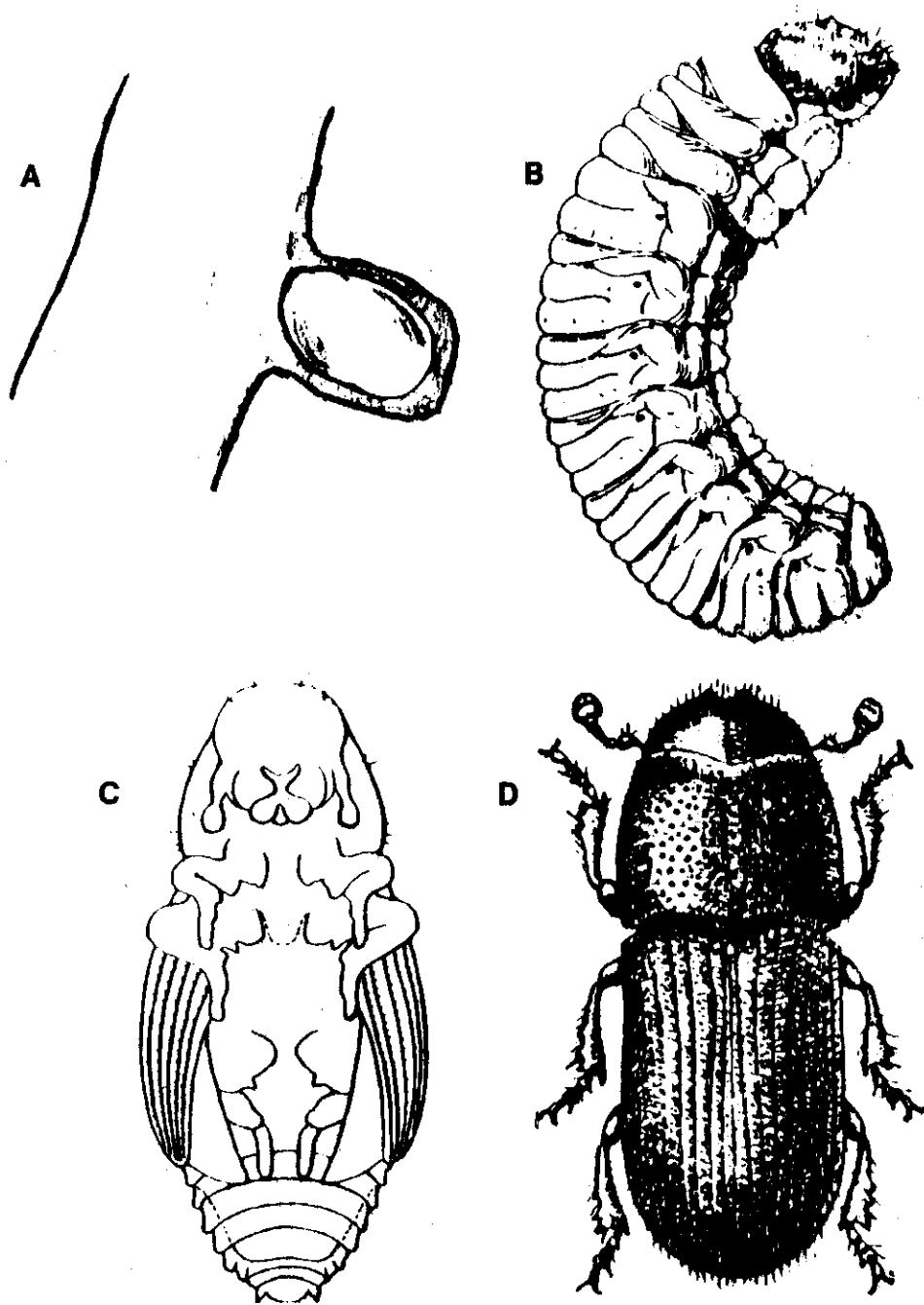


Figure 1. Stages of the southern pine beetle:  
A, egg; B, larva; C, pupa; D, adult.

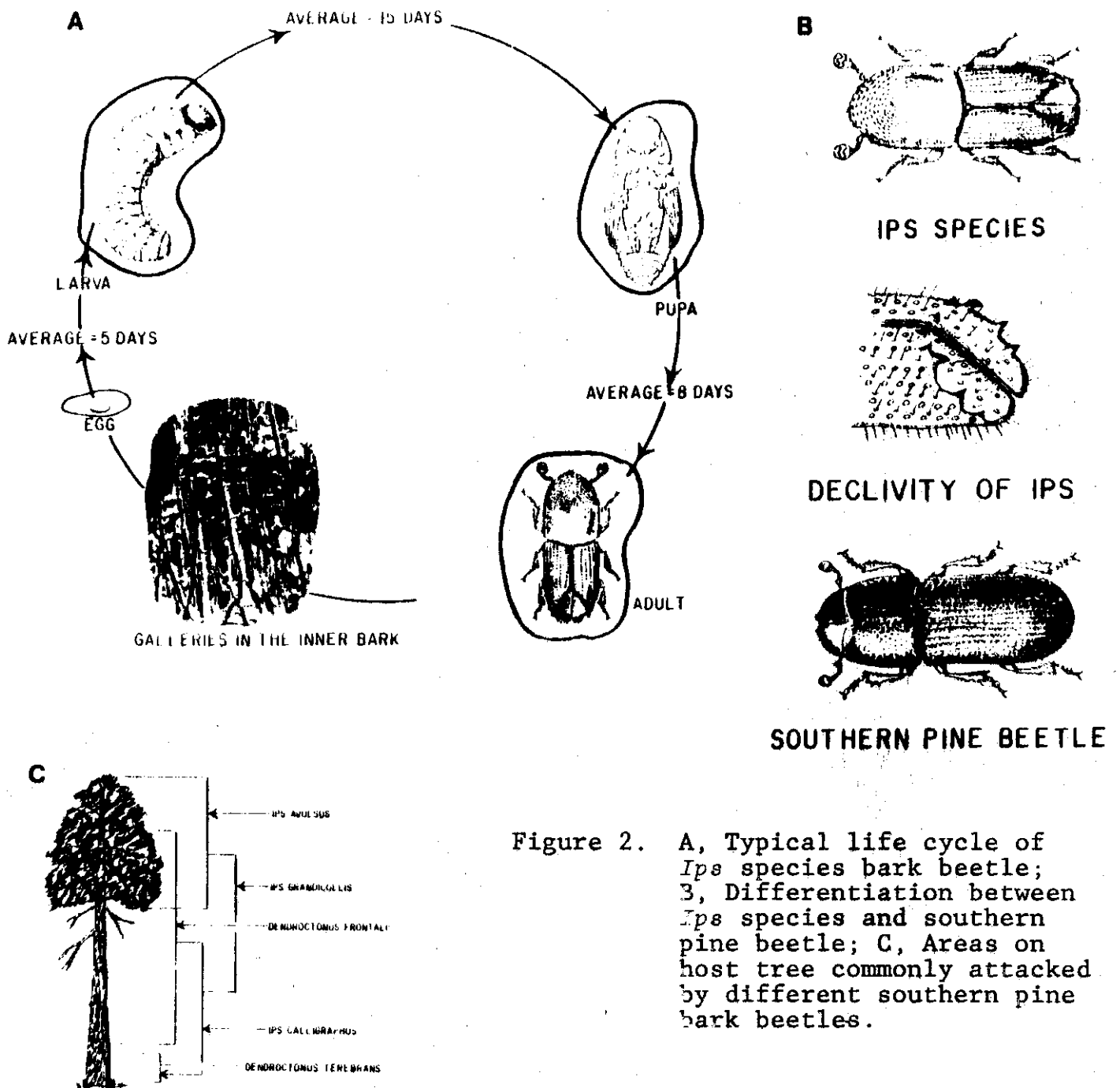


Figure 2. A, Typical life cycle of *Ips* species bark beetle; B, Differentiation between *Ips* species and southern pine beetle; C, Areas on host tree commonly attacked by different southern pine bark beetles.

## RESULTS AND DISCUSSION

The results of this evaluation are summarized in Table 1. All three units are experiencing outbreaks of the southern pine beetle. Locations of heaviest infestations are illustrated in Figures 3-5. Results of this evaluation pertain only to Forest Service lands since only spots occurring within the national forest boundary were plotted and ground checked. However, large infestations were observed on private lands surrounding Forest Service lands.

Nine of the eleven spots examined had a basal area of 130 sq. ft. per acre or more. The average basal area for all spots examined was 150 sq. ft. per acre. Stands which are overstocked or stagnated are more susceptible to attack by bark Beetles (Coulson, et. al., 1974, Ku et. al., 1976, Lorio, 1968).

Although the southern pine beetle populations are active throughout the Tombigbee Ranger District, the *Ips* engraver beetles were found to be the primary causal agent at some spots on the Yalobusha Unit. If conditions become favorable for population increase the southern pine beetle will probably replace the *Ips* species as the primary invader in these areas.

The low ratio of green infested to red and fading trees indicates little growth in spot size. This may be attributed to the extremely cold weather experienced prior to ground examinations. Bark samples collected were examined in the laboratory for brood mortality. Brood mortality up to 75% was observed. Black larvae and pupae, as illustrated in Figure 6, are characteristic symptoms of mortality caused by low temperatures. Although the cold weather caused high brood mortality, surviving brood were observed in all infestations examined.

Approximately 68 percent of the total acreage of Forest Service land for the three units is occupied by susceptible pine host. Southern pine beetle infestations were found throughout the host type, but activity was concentrated in the areas shown in Figures 3-5.

In summary, the potential for a severe southern pine beetle outbreak exists on the Tombigbee Ranger District (Yalobusha, Trace and Ackerman Units) of the Tombigbee and Holly Springs National Forests. This potential exists

Table 1. Summary of aerial and ground survey data, southern pine beetle evaluation, Tombigbee Ranger District, Mississippi.

	Ranger Unit		Ackerman
	Yalobusha	Trace	
1. Results compiled from data collected during the aerial phase of the evaluation:	Sketchmap	Sketchmap	Sketchmap
Survey type . . . . .			
Date of aerial survey . . . . .	1/18/77	1/17/77	1/18/77
Percent survey. . . . .	50%	50%	50%
Total acreage surveyed. . . . .	33,420	36,141	58,532
Total acreage of Forest Service land. . . . .	20,255	26,001	39,549
Susceptible host type acreage of Forest Service land. . . . .	14,932	18,098	25,316
Total number of spots on Forest Service lands . . . . .	40	28	46
Spots per M acre of host type Forest Service lands. . . . .	2.7	1.5	1.8
Average spot size (trees) Forest Service lands. . . . .	24.8	70.6	10.3
Range of spot sizes (trees) Forest Service lands. . . . .	2-200	2-350	2-200
Reds and faders/M acres host type on Forest Service lands . . . . .	61.9	78.8	36.3
2. Results compiled from data collected during the ground and aerial phases of the evaluation:			
Date of ground phase. . . . .	2/23/77	2/22/77	2/23/77
Infested trees per M acre of host type Forest Service lands . . . . .	63.2	91.4	36.8
Total number of infested trees on Forest Service lands. . . . .	941	1,654	932
Total volume of infested trees on Forest Service lands. . . . .	62.1 MBF	160.3 MBF	93.1 MBF
Total number of affected trees on Forest Service lands. . . . .	992	1,976	932
Total volume of affected trees on Forest Service lands. . . . .	65.5 MBF	191.5 MBF	93.1 MBF
Ratio of green infested to total red and fading trees. . . . .	0.01:1	0.16:1	0.0:1

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd. ft. per cord.

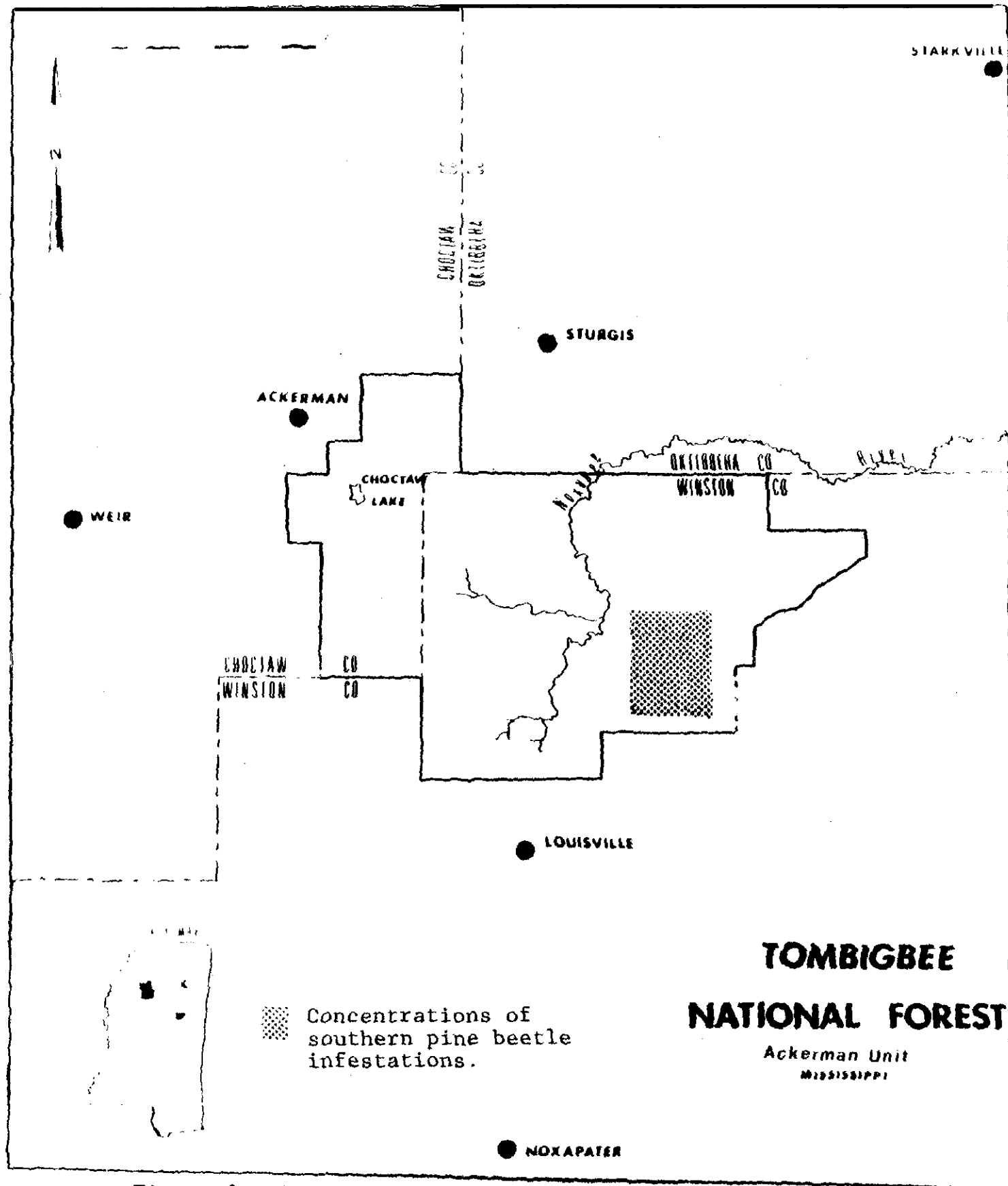


Figure 3. Southern pine beetle infestations, Ackerman Unit, Tombigbee National Forest.

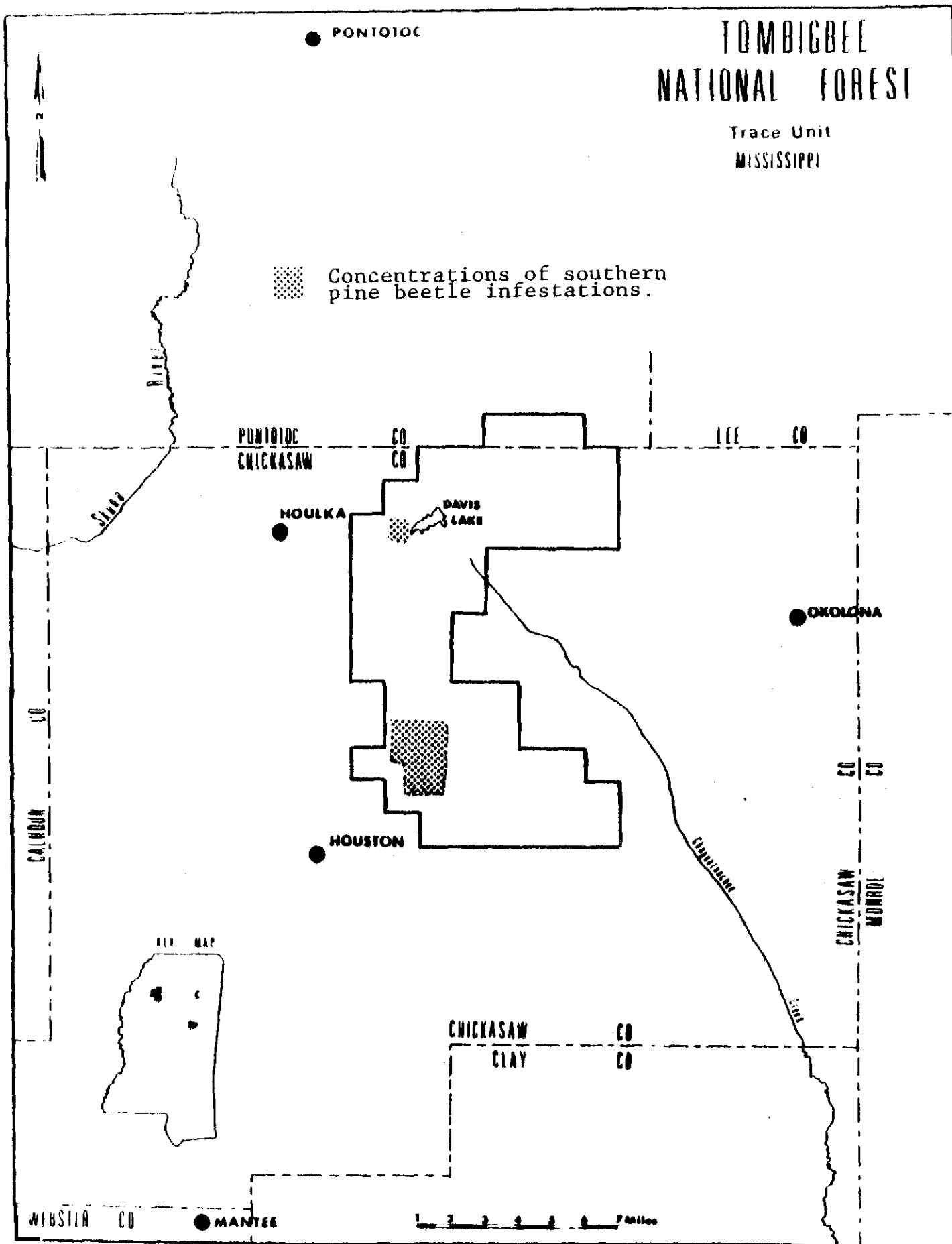


Figure 4. Southern pine beetle infestations, Trace Unit, Tombigbee National Forest.



# HOLLY SPRINGS NATIONAL FOREST

Yalobusha Unit  
MISSISSIPPI

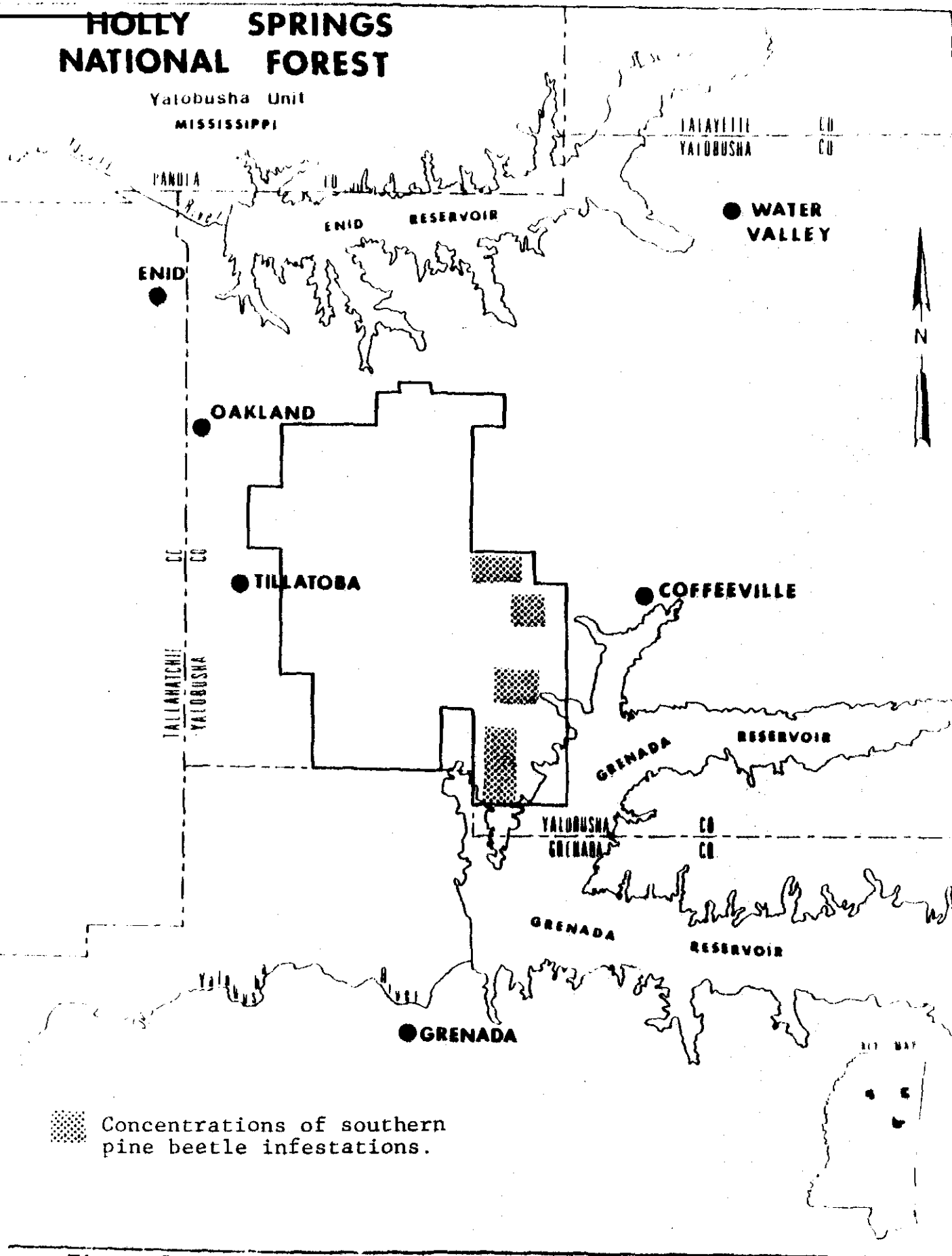


Figure 5. Southern pine beetle infestations, Yalobusha Unit, Holly Springs National Forest



Figure 6. Southern pine beetle larvae mortality due to low temperatures. Note the black color of the larvae.

due to the large number of scattered infestations on private and Forest Service lands with a large percentage of susceptible pine host type, stands with high basal area, and healthy brood at all infestations examined.

## RECOMMENDATIONS

The potential for increased timber mortality from southern pine beetle activity is high and resource values appear high enough to warrant a suppression project in order to reduce additional losses. Since infestations are scattered throughout most of the host type, emphasis should be placed on suppressing those infestations with the greatest number of actively infested trees in stands with high basal area in areas of greatest resource values. Ranger District personnel should locate all currently infested spots using systematic aerial survey techniques.

Any control action taken should follow the procedures outlined in FSM-5250.

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

Where practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, non-infested trees surrounding the spot may be marked to provide an operable cut.

timber from a spot should be as follows:

Trees having nearly developed broods (usually the red and fading trees).

Trees having young broods (usually the green, recently infested trees).

Trees in the buffer zone.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the piling and burning operation.
3. Chemical Control. Chemical formulation recommended for southern pine beetle control is a 1/2 percent lindane spray with No. 2 fuel oil as the carrier. This may be formulated from a 20 percent lindane emulsifiable concentrate or oil concentrate at the rate of 11 pints of concentrate in enough fuel oil to make 55 gallons of spray. (Ratio of one part 20 percent lindane EC to 39 parts No. 2 diesel fuel).

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Spray stumps and bark removed by woodpeckers. Low pressure sprayers may be used to treat large, accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetles have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in section 8.3 of the Forest Service Health and Safety Code and FSM 5242.21. Detailed safety procedures should be outlined in the project suppression plan.

4. Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated within two or three weeks after treatment to check for additional infested trees. If additional trees are found, treat them.
5. Appropriate silvicultural treatments consistent with current resource management objectives should be prescribed in infested areas to avoid chronic southern pine beetle outbreaks.

## PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key--out of the reach of children and animals--away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

## REFERENCES

- Coulson, R. N., F. P. Hain, and T. L. Payne. 1974. Radial growth characteristics and stand density of loblolly pine in relation to the occurrence of the southern pine beetle. Environ. Ent. 3:425-428.
- Ku, T. T., J. Sweeney, and V. Shelburne. 1976. Preliminary evaluation of site and stand characteristics associated with southern pine beetle infestations in Arkansas. Arkansas Farm Research 5:25.
- Lorio, P. L. 1968. Soil and stand conditions related to southern pine beetle activity in Hardin County, Texas. J. Econ. Ent. 61:565-566.

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For any additional information, Contact:  
Forest Insect and Disease Management Unit  
Southeastern Area, State & Private Forestry  
Northgate Office Park, Room 2103  
3620 Interstate 85, N.E.  
Doraville, Georgia 30340  
Telephone 404-221-4796